PARALLELOCRINUS (CRINOIDEA, INADUNATA) IN THE AMES LIMESTONE, PENNSYLVANIAN, OF OHIO[1]

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ABSTRACT

A new erisocrinid, *Parallelocrinus sturgeoni* sp. nov. from the Ames Limestone, Conemaugh Group, Pennsylvanian, of Guernsey County, Ohio, is described. The species differs from *Parallelocrinus typus* Knapp in having steeper sloping infrabasal plates; broader and flatter basal circlet; radials with steeper lateral walls, less prominent and stronger sloping forefacets, and outward-facing articular facets; and cup plates without nodes, having fine ornament only.

The inadunate crinoid genus *Parallelocrinus* was proposed by Knapp (1969). *Parallelocrinus typus* Knapp, the genotype species, occurs in the Burgner Formation, of Atokan age, in Jasper County, Missouri. In the present paper a second species is attributed to the genus. Derived from the Conemaugh Group of Ohio, its discovery extends the chronologic range of the genus to the Upper Pennsylvanian and the geographic range to the Appalachian region.

I am indebted to Dr. Porter M. Kier and the National Museum of Natural History for loaning me the type of *Parallelocrinus typus* for comparative study. I also wish to thank Mr. Bruce Frumker, staff photographer, for making the photographs from which the illustrations were taken.

The species is named for Dr. Myron T. Sturgeon, of Ohio University, in recognition of his contributions to the geology and paleontology of Ohio.

SYSTEMATIC PALEONTOLOGY

Family Erisocrinidae Miller, 1889

Genus *Parallelocrinus* Knapp, 1969, emended

Diagnosis: Erisocrinids with small pits or dimples at proximal angles of radials; radial-basal and interradial sutures in floors of broad hollows; distal portions of basals standing out in strong relief, with tips elevated above floors of hollows; forefacets of radials deep.

Type species: *Parallelocrinus typus* Knapp, 1969.

Parallelocrinus sturgeoni sp. nov.
Fig. 1–4

Diagnosis: Dorsal cup approaching *Parallelocrinus typus* Knapp in size (width 20.3 mm) and form ratio (0.37), but differing as follows: steeper sloping infrabasal plates; broader and

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flatter basal circlet; radials with steeper lateral walls, less prominent and stronger sloping forefacets, and outward-facing articular facets; cup plates without nodes, showing fine ornament only.

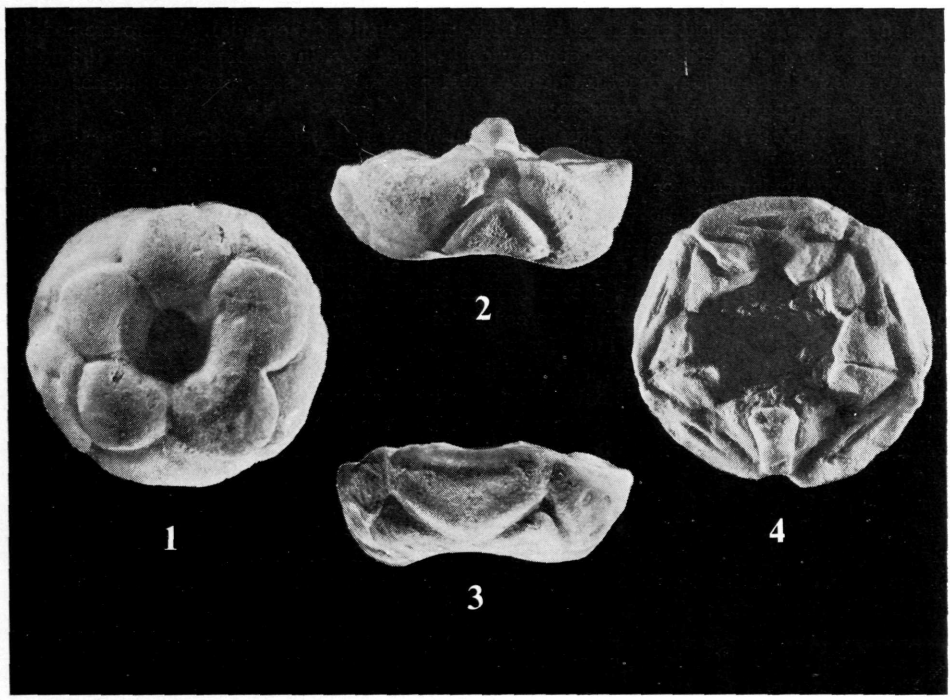
Holotype: Cleveland Museum of Natural History 3845, a dorsal cup.

Occurrence: Ames Limestone, Conemaugh Group, Upper Pennsylvanian.

Locality: Road cut exposure on south side of Interstate 70 and east of junction with Ohio Route 513, NW¼ Sec. 25 (lat. 40° 03′ 07″ N, long. 81° 19′ W), Oxford Township, near Middlebourne, Guernsey County, Ohio.

Respository: Cleveland Museum of Natural History, Cleveland, Ohio.

Description: This species shows a truncate bowl-shaped cup of moderate height, with rather gently sloping sides. The outline is subround in dorsal view and subpentagonal in ventral view. The cup is somewhat asymmetrical in the posterior region, where the right



FIGURES 1–4. *Parallelocrinus sturgeoni* Burke, sp. nov. Holotype, CMNH 3845, from the Ames Limestone, Conemaugh Group, near Middlebourne, Guernsey County, Ohio. Fig. 1, dorsal view; fig. 2, posterior view; fig. 3, anterior view; fig. 4, ventral view. ×2.

side is slightly higher than the left. The width of the basal impression is less than half the diameter of the cup. A portion of the stem, showing a pentolobate lumen, is still in place; consequently the height of the impression and that of the infrabasals has not been determined. The infrabasals are steep sided and flare outward slightly.

Proximally the basals bend outward and downward from within the basal impression with moderate curvature, and are slightly concave from side to side. At the basal plane, where these plates attain their greatest width, all except the posterior basal tend to flatten; the posterior plate remains concave from side to side. From the basal plane the plates curve outward and upward along the lateral wall of the cup, rather gently at first, but more steeply in their distal reaches. The posterior basal is much more elongate than are the others and is not truncated; distally it terminates in a sharp tip and does not come in contact with anal X.

Rounded slopes define the margins of the radial and basal plates, and the sutures between the two circlets lie in the floors of broad hollows which are continuous with similar hollows along the interradial sutures. As a consequence, the distal extremities of the basals stand out in strong relief, with tips elevated above the conjoined hollows, giving the basal circlet the appearance of a thick-petaled flower.

The left posterior and left anterior basals are nearly the same size and are noticeably smaller than the other three plates of the circlet. It is also of interest that, at the corners where the tip of a radial meets with the distal termination of each interbasal suture, there is a tiny pit of the type that characterizes *Endelocrinus*.

With the exception of the attenuated posterior basal, the slope of which is fully as steep as that of the adjacent radials, the radial slopes are steeper than are those of the basals. In the vicinity of the midregion, however, there is a transverse chevron-like area where the radials are very slightly concave, beyond which they slope outward again to the forefacet. The forefacet is prominent and slopes inward to the summit of the radial. There are nodelike outbendings of the superior corners of the radials, and these, in combination with the outlets of the interradial hollows, constitute interradial notches of a sort, but the notches do not intervene between the articular surfaces.

In ventral view, the forefacet is a prominent feature, although its depth is less than half that of the articular surface. The radial facets face outward at a moderate angle. Preservation of the articular surfaces leaves much to be desired. The plates show strong outer ligament ridges; the outer ligament area preserves traces of denticles, and the ligament pit is deep and slitlike. The transverse crest is prominent and denticulate, and the ligament fossae are well developed. The adsutural slopes are steep and the intermuscular notch broadly V-shaped.

Anal X, as noted previously, does not make contact with the posterior basal. There is a deep pit in the posterior interradius where the two posterior radials have a short sutural contact; the tip of the posterior basal terminates at the sutures and does not meet with the sharply V-shaped proximal part of anal X, which originates above the interradial suture. The portion of anal X that enters the cup is only about a millimeter in length. Proximally, there is an angular break in its surface just above the summit of the cup. The plate is inclined inward, gradually increasing in height and expanding in width as it approaches the body cavity, and is slightly concave along the sides where it met with the primibrachs. Distally the articular surface faces inward and upward, and bears two facets.

The ornament varies from fairly discrete small granules to a network of fine intersecting ridges; the latter are more evident near the plate boundaries and tend to be elongate on the slopes of the hollows between the radials and basals. Ornament is found on anal X, the radials, and the distal surfaces of the basals.

A boring organism, probably a gastropod, has severely damaged the left anterior radial on the DE side. The adjoining left posterior radial and left posterior basal are also damaged, but less extensively.

Linear measurements, in millimeters, of the holotypes of *Parallelocrinus sturgeoni* and of *Parallelocrinus typus* are as follows:

	Parallelocrinus sturgeoni CMNH 3845	*Parallelocrinus typus* NMNH 144981
Height of dorsal cup	7.5	7.1
Width of dorsal cup (max.)	20.3	19.6
Ratio of height to width	0.37	0.36
Height of basal impression	3.8+	4.0
Width of basal impression	9.3	9.0
Length of basal (laB)	7.6	6.5
Width of basal (laB)	7.0	6.0
Length of radial (aR)	6.3	6.0
Width of radial (aR)	10.5	10.0
Length of suture between basals	4.9	4.0
Length of suture between radials	3.4	3.0
Height of anal X	4.0	3.0
Width of anal X	3.2	2.0

DISCUSSION

Both *Parallelocrinus sturgeoni* and *Parallelocrinus typus* are characterized by two facets on the distal articular surface of anal X. The occurrence of two distal facets on this plate is not unusual in Lower Pennsylvanian erisocrinids, and in a few lineages it persists into the Upper Pennsylvanian. The arrangement of tube plates in inadunate crinoids is subject to much variation, and the presence of these facets on anal X is not a reliable criterion for generic distinction. As a matter of fact, in some erisocrinids, the number of facets seems to vary within the species. A specimen in the collection of the National Museum of Natural History from the Ocheleta Group near Bartlesville, Oklahoma, identified by Mr. Harrel Strimple as *Delocrinus nodosarius*, shows two facets in this position, but a single distal facet characterizes anal X of each of the two cotypes of that species. The separation of anal X from the posterior basal is, of course, a common variation in *Delocrinus* and *Endelocrinus* and is of no value for specific distinction.

It should be noted that, although the presence of nodes in *Parallelocrinus sturgeoni* constitutes the principal difference in ornament between this species and *Parallelocrinus typus*, the latter species also bears fine ornament, which is much finer but is otherwise quite similar to that of the Ohio species, distributed over areas of the plate surface, including the nodes.

Knapp (1969, pl. 61, fig. 22–24) illustrates another specimen (UM 14805), which he designates a paratype of "*Palmerocrinus*" *comptus*. The dorsal cup of this specimen resembles the holotype of *Parallelocrinus typus* in most respects (Knapp, 1969, fig. 10–12), having nodes on the radials, distal reaches of the basals standing out in relief, deep forefacets, and interradial notches. It is slightly larger than the dorsal cup of *Parallelocrinus typus* (NMNH 144981), the form ratio of which is 0.36, in contrast with 0.38 for UM 14805. Incidentally, the width of the dorsal cup (24.6 mm) of the holotype of *Parallelocrinus typus* which Knapp (1969, p. 386) gives is in error, and led to his deriving an incorrect form ratio (0.29). However, the maximum width (19.6 mm) noted in the caption (Knapp, 1969, fig. 16, p. 362) is correct, and the actual form ratio is 0.36.

The other figured specimens assigned to "*Palmerocrinus*" *comptus* by Knapp (1969, pl. 61, fig. 13–21) appear to represent a species of *Delocrinus*. In any case, they are quite distinct both generically and specifically from UM 14805, which has much the appearance of *Parallelocrinus typus*.

Parallelocrinus appears to be as worthy of generic distinction from other erisocrinids as *Endelocrinus*, but it must be granted that it closely resembles the latter genus. The pits at the proximal angles of the radials are like those found in *Endelocrinus*, and the deep forefacets present in *Parallelocrinus* also characterize *Endelocrinus rectus* and *Endelocrinus kieri*. In an earlier discussion (Burke, 1966, p. 463), I noted that, in *Endelocrinus kieri*, the pits at the apices of the basals tend to become confluent with the interradial hollows with increase in age. However, *Parallelocrinus* differs from *Endelocrinus* and other erisocrinids, insofar as I know, in having the distal portions of the basals standing out in relief, with their tips elevated above the hollows. The fact that *Parallelocrinus* has preserved, from Atokan to Conemaughan time, the combination of characters cited in the diagnosis also argues in favor of its being a distinct genus.

LITERATURE CITED

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